In conclusion, there is clear evidence that both acute and chronic UV exposure causes damage to the skin. There is clear evidence that sun protection measures, including avoidance, sun protective clothing, and sunscreen, will all reduce the dose of radiation that the skin receives. There is some evidence that the reduction in exposure that is currently achievable does reduce some of the risks associated with such exposure. There is little evidence to support a real harm associated with these sun avoidance measures, and therefore, on balance, it is still advisable that individuals with skin types I–IV take measures to protect themselves from the sun whenever they are exposed or likely to be exposed.

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All people should wear sunscreen or other protection for their skin whenever they are exposed to sunlight

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NO

Bone doctors seem prone to contradicting colleagues from other disciplines when it comes to public health messages. The first obvious example is advice regarding body weight—most doctors badger their patients to remain thin but, in bone health, excessive thinness is a significant risk factor for osteoporotic fractures. Sunlight exposure represents a similar set of contradictions. New Zealand has many fair-skinned residents and a sunny climate, resulting in one of the world's highest rates of skin cancer, so sunlight avoidance seems logical. However, mineral metabolism is critically dependent on adequate levels of vitamin D which, despite its name, is absent from most diets and is in fact a pro-hormone made in the skin as a result of ultraviolet (UV) light exposure. Thus, vitamin D deficiency is usually a result of poor sunlight exposure and the cheapest strategy for its prevention is encouragement of regular time in the sun. Is this compatible with the sun-safe messages promoted by dermatologists?

The answer is probably yes. In temperate countries, the individuals most at risk of vitamin D

deficiency are those with dark skins, since the UV light is absorbed by melanin and therefore not available for the creation of vitamin D. These individuals (particularly those of African and Indian origin) have much lower risks of skin cancer than Europeans, and provide the majority of the cases presenting with rickets and osteomalacia in New Zealand.[1] They and their children need to be made aware of their need for regular sunlight exposure or, if this is not possible, be provided with oral vitamin D supplements to enable growth and development to progress normally.

Frail elderly Europeans present a more difficult situation. Their frailty may confine them indoors, yet their pale skin and long history of sun exposure places them at high risk of skin cancers. In the absence of any intervention, clinical osteomalacia (including myopathy) does occur in this group, and oral vitamin D supplements (1–2 multivitamin tablets daily, each typically containing 400–800 IU of vitamin D, or calciferol 1.25 mg/month) are probably the simplest interventions.

Putting aside these two high-risk groups, what recommendations should we provide to the rest of the population? The first issue here is what levels of vitamin D are necessary for health. In recent years, there has been an explosion of reports of multiple disease associations with vitamin D. This includes various forms of cancer, cardiovascular disease, many infections, fractures, autoimmune diseases, neurological conditions and simply being admitted to hospital. Many authors have inferred causation from these descriptions of association. Such inferences cannot be drawn from observational studies, which properly provide hypothesis generation. Available trial data do not suggest that achieving very high levels of vitamin D (>70 nmol/L) is helpful, and the recent report from the Institute of Medicine in the United States was that minimum levels of serum 25-hydroxyvitamin D should be 40–50 nmol/L.[2] Such levels are achievable with modest amounts of sunlight exposure that fall well short of those that are likely to cause skin damage. For instance, we have demonstrated that elderly individuals who spend 15–30 minutes outside daily in Auckland in October can achieve these levels.[3] Based on UV light intensity, it has been calculated that fair-skinned individuals in Auckland and Christchurch need to expose their arms and hands (or equivalent skin area) to mid-morning or mid-afternoon sunshine for only 6–8 minutes in the summer to achieve satisfactory vitamin D status.[4] These levels of exposure produces less than one third of a minimal erythemal dose, suggesting that the risk of significant skin damage is very low. In the winter, exposure at noon is required for 24 minutes in Auckland and for >40 minutes in Christchurch, to maintain these levels. Individuals with highly pigmented skin have exposure times 3–6 times greater than this.[5]

Thus, we should be providing a balanced message, encouraging regular sunlight exposure, but emphasising that in summer this can be brief, and it should not be in the middle of the day when the risk of skin damage is high. In winter in the South Island, some level of vitamin D deficiency is almost inevitable without supplementation, unless substantial reserves of vitamin D (which is stored in adipose tissue) have been built up during the warmer months. This is reflected in the 2012 Consensus Statement from the Ministry of Health, encouraging daily outdoor activity in the early morning and late afternoon during summer, and in the middle of the day during winter.[6] Sunshine is neither saviour nor demon, but exposure in moderation is an important part of healthy living.

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